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Question Paper Code : 80594

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Computer Science and Engineering

IT 6006 — DATA ANALYTICS

(Common to Information Technology)

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the characteristics of big data.
2. Tabulate the differences between analysis and reporting.
3. Illustrate a neural network.
4. Define rule induction.
5. Give the advantages of the algorithm used in estimating moments.
6. Differentiate between data stream mining and traditional data mining.
7. State the use of a priori algorithm in data mining.
8. What are the problems faced if clustering exists in non-euclidean space?
9. Summarize the features of Hive.
10. Why is HDFS preferred to RDBMS?

PART B — (5 × 16 = 80 marks)

11. (a) Discuss statistical inference in detail. (16)
- Or
- (b) (i) What are the issues and challenges related to storage and transport in big data? (8)
- (ii) Draw a comparison between the traditional analytic architecture and modern in-database architecture. (8)
12. (a) How is multivariate analysis performed in big data? Show with an illustration. (16)
- Or
- (b) List all the methods of stochastic search. Elucidate any four in detail. (16)
13. (a) What are streams? Explain stream data model with its architecture. (16)
- Or
- (b) Taking stock market predictions as a case study, elaborate on the Realtime Analytics Platform (RTAP). Present the assumptions made. (16)
14. (a) Describe the various hierarchical methods of cluster analysis. (16)
- Or
- (b) Write short notes on the following :
- (i) CLIQUE. (8)
- (ii) Frequent pattern based clustering methods. (8)
15. (a) Deliberate how data flow takes place in MapReduce framework. (16)
- Or
- (b) Discuss the different visual data analysis techniques with diagrams and graphs. (16)

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Question Paper Code : 80304

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Computer Science and Engineering

CS 6701 — CRYPTOGRAPHY AND NETWORK SECURITY

(Common to Seventh Semester Information Technology)

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Compare active and passive attack.
2. Find gcd (1970, 1066) using Euclid's algorithm.
3. Brief the strengths of triple DES.
4. What is an elliptic curve?
5. State any three requirements for authentication.
6. Differentiate MAC and Hash function.
7. List the three classes of intruders.
8. Define Zombie.
9. List the limitations of SMTP/RFC 822.
10. Define Botnets.

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) Explain OSI Security Architecture model with neat diagram. (8)
(ii) Describe the various security mechanisms. (8)

Or

- (b) (i) State Chinese Remainder theorem and find X for the given set of congruent equations using CRT.
 $X = 2(\text{mod } 3)$
 $X = 3(\text{mod } 5)$
 $X = 2(\text{mod } 7)$. (8)
(ii) State and prove Fermat's theorem. (8)

12. (a) Explain AES algorithm with all its round functions in detail. (16)
Or

- (b) Explain RSA algorithm, perform encryption and decryption to the system with $p = 7$, $q = 11$, $e = 17$, $M = 8$. (16)

13. (a) Describe MD5 algorithm in detail. Compare its performance with SHA-1. (16)

Or

- (b) Explain digital signature standard with necessary diagrams in detail. (16)

14. (a) Discuss Client Server Mutual authentication, with example flow diagram. (16)

Or

- (b) Explain the technical details of firewall and describe any three types of firewall with neat diagram. (16)

15. (a) Discuss the working of SET with neat diagram. (16)

Or

- (b) Explain the operational description of PGP. (16)

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Question Paper Code : 80305

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Computer Science and Engineering

CS 6702 — GRAPH THEORY AND APPLICATIONS

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

-PART A — ($10 \times 2 = 20$ marks)

1. Define walk, path and circuit in a graph.
2. What is meant by eccentricity?
3. Define 1-isomorphic and 2-isomorphic.
4. What are the applications of planar graph?
5. Define minimal dominating set and maximal independent set.
6. Find the chromatic number of a complete graph of n vertices.
7. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?
8. A committee including 3 boys and 4 girls is to be formed from a group of 10 boys and 12 girls. How many different committees can be formed from the group?
9. Define recurrence relation.
10. Define generating function.

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) Show that the maximum number of edges in a simple graph with n vertices is $n(n-1)/2$. (6)
- (ii) Prove that if a graph has exactly two vertices of odd degree, there must be path joining these two vertices. (5)
- (iii) Prove that any two simple connected graphs with n vertices, all of degree two, are isomorphic. (5)

Or

- (b) (i) Mention some of the properties of tree. (5)
 (ii) Prove that in any tree, there are atleast two pendant vertices. (5)
 (iii) Show that a Hamiltonian path is a spanning tree. (6)
12. (a) (i) Explain max-flow min-cut theorem. (10)
 (ii) Explain about Fundamental cut set and Fundamental circuit in a graph. (6)

Or

- (b) (i) Prove that every connected graph has atleast one spanning tree. (6)
 (ii) Prove the graphs K_5 and $K_{3,3}$ are non planar. (10)
13. (a) (i) Prove that every tree with two or more vertices is 2-chromatic. (5)
 (ii) Prove that a graph of n vertices is a complete graph iff its chromatic polynomial is
- $$P_n(\lambda) = \lambda(\lambda-1)(\lambda-2)\dots(\lambda-n+1). \quad (6)$$
- (iii) Prove that a covering g of a graph is minimal iff g contains no paths of length three or more. (5)

Or

- (b) (i) Explain Euler digraph. (10)
 (ii) Discuss about some types of digraph with suitable example. (6)
14. (a) (i) How many arrangements are there of all the vowels adjacent in SOCIOLOGICAL? (4)
 (ii) Find the value of n for the following : $2P(n, 2) + 50 = P(2n, 2)$. (5)
 (iii) How many distinct four-digit integers can one make from the digits 1, 3, 3, 7, 7 and 8? (4)
 (iv) In how many possible ways could a student answer a 10-question true-false test? (3)

Or

- (b) (i) How many arrangements of the letters in MISSISSIPPI has no consecutive S's? (4)
 (ii) A gym coach must select 11 seniors to play on a football team. If he can make his selection in 12,376 ways, how many seniors are eligible to play? (4)
 (iii) How many permutations of size 3 can one produce with the letters m, r, a, f and t? (4)
 (iv) Rama has two dozen each of n different colored beads. If she can select 20 beads (with repetitions of colors allowed), in 230,230 ways, what is the value of n ? (4)

15. (a) (i) Discuss about exponential generating function with an example. (10)

(ii) Find the unique solution of the recurrence relation
 $6a_n - 7a_{n-1} = 0, n \geq 1, a_3 = 343$. (6)

Or

(b) (i) The population of Mumbai city is 6,000,000 at the end of the year 2015. The number of immigrants is 20000 n at the end of year n. The population of the city increases at the rate of 5% per year. Use a recurrence relation to determine the population of the city at the end of 2025. (8)

(ii) Write short notes on summation operator. (8)

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Question Paper Code : 80306

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Computer Science and Engineering

CS 6703 — GRID AND CLOUD COMPUTING

(Common to Seventh Semester Information Technology)

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Bring out the differences between private cloud and public cloud.
2. Highlight the importance of the term "cloud computing".
3. List the requirements of resource sharing in a grid.
4. What are the security concerns associated with the grid?
5. Give the role of a VM.
6. Why do we need a hybrid cloud?
7. Name any four services offered in GT4.
8. What are the advantages of using Hadoop?
9. Mention the importance of Transport Level Security.
10. Discuss on the application and use of identity and access management.

PART B — (5 × 16 = 80 marks)

11. (a) Illustrate the architecture of virtual machine and brief about the operations.

Or

- (b) Write short notes on :

- (i) cluster of cooperative computers. (8)
- (ii) service oriented architecture. (8)

12. (a) With a neat sketch, discuss the OGSA framework.

Or

- (b) Explain the data intensive grid service models with suitable diagrams.

13. (a) List the cloud deployment models and give a detailed note about them.

Or

- (b) Give the importance of cloud computing and elaborate the different types of services offered by it.

14. (a) Draw and explain the global toolkit architecture.

Or

- (b) Give a detailed note on Hadoop framework.

15. (a) Explain trust models for grid security environment.

Or

- (b) Write in detail about cloud security infrastructure.

PART B — (5 × 16 = 80 marks)

11. (a) Solve the following linear programming problem using graphical method. (16)

$$\text{Maximize } Z = 100X_1 + 80X_2$$

$$\text{Subject to } 5X_1 + 10X_2 \leq 50$$

$$8X_1 + 2X_2 \geq 16$$

$$3X_1 - 2X_2 \geq 6$$

$$X_1 \text{ and } X_2 \geq 0$$

Or

- (b) Solve the following LPP by simplex method. (16)

$$\text{Max } Z = 4x_1 + x_2 + 3x_3 + 5x_4$$

$$\text{Subject to } 4x_1 - 6x_2 - 5x_3 + 4x_4 \geq -20$$

$$3x_1 - 2x_2 + 4x_3 + x_4 \leq 10$$

$$8x_1 - 3x_2 + 3x_3 + 2x_4 \leq 20$$

$$x_1, x_2, x_3, x_4 \geq 0$$

12. (a) Use dual simplex method to solve the LPP. (16)

$$\text{Maximize } Z = -3x_1 - 2x_2$$

$$\text{Subject to } x_1 + x_2 \geq 1$$

$$x_1 + x_2 \leq 7$$

$$x_1 + 2x_2 \geq 10$$

$$x_2 \leq 3$$

$$\text{and } x_1, x_2 \geq 0$$

Or

- (b) Consider the problem of assigning four sales persons to four different sales regions as shown in the following table such that the total sales is maximized.

| | | Sales region | | | |
|----------|---|--------------|----|----|----|
| | | 1 | 2 | 3 | 4 |
| Salesman | 1 | 10 | 22 | 12 | 14 |
| | 2 | 16 | 18 | 22 | 10 |
| | 3 | 24 | 20 | 12 | 18 |
| | 4 | 16 | 14 | 24 | 20 |

The cell entries represent annual sales figures in lakhs of rupees. Find the optional allocation of the sales persons to different regions. (16)

13. (a) Solve the following IPP. (16)

$$\text{Minimize } Z = -2x_1 - 3x_2$$

$$\text{Subject to } 2x_1 + 2x_2 \leq 7$$

$$x_1 \leq 2$$

$$x_2 \leq 2$$

$$\text{and } x_1, x_2 \geq 0 \text{ and integers.}$$

Or

- (b) A student has to take examinations in three courses A, B and C. He has three days available for study. He feels it would be best to devote a whole day to the study of the same course, so that he may study a course for one day, two days or three days or not at all. His estimates of grades he may get by study are as follows:

| Course/Study days | A | B | C |
|-------------------|---|---|---|
| 0 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 |
| 2 | 1 | 3 | 3 |
| 3 | 3 | 4 | 3 |

How should he plan to study so that he maximizes the sum of his grades? (16)

14. (a) Using Jacobian method Max $Z = 2x_1 + 3x_2$ (16)

$$\text{Subject to } x_1 + x_2 + x_3 = 5$$

$$x_1 + x_2 + x_4 = 3$$

$$x_1, x_2, x_3, x_4 \geq 0.$$

Or

- (b) Solve the nonlinear programming problem by Khun-Tucker conditions. (16)

$$\text{Minimize } f(x) = x_1^2 + x_2^2 + x_3^2$$

$$\text{Subject to } g_1(X) = 2x_1 + x_2 - 5 \leq 0$$

$$g_2(X) = x_1 + x_2 - 2 \leq 0$$

$$g_3(X) = 1 - x_1 \leq 0$$

$$g_4(X) = 2 - x_2 \leq 0$$

$$g_5(X) = -x_3 \leq 0.$$

15. (a) A project consists of activities from A to J as shown in the following table. The immediate predecessor(s) and the duration in weeks of each of the activities are given in the same table. Draw the project network and, find the critical path and the corresponding project completion time. Also, find the total float as well as free float for each of the non-critical activities. (16)

| Activity | Immediate Predecessor (s) | Duration (weeks) |
|----------|---------------------------|------------------|
| A | - | 4 |
| B | - | 3 |
| C | A, B | 2 |
| D | A, B | 5 |
| E | B | 6 |
| F | C | 4 |
| G | D | 3 |
| H | F, G | 7 |
| I | F, G | 4 |
| J | E, H | 2 |

Or

- (b) Consider the data of a project summarized in the following table :

| Activity | Immediate Predecessor(s) | Duration (weeks) | | |
|----------|--------------------------|------------------|----------|----------|
| | | <i>a</i> | <i>m</i> | <i>b</i> |
| A | - | 4 | 4 | 10 |
| B | - | 1 | 2 | 9 |
| C | - | 2 | 5 | 14 |
| D | A | 1 | 4 | 7 |
| E | A | 1 | 2 | 3 |
| F | A | 1 | 5 | 9 |
| G | B, C | 1 | 2 | 9 |
| H | C | 4 | 4 | 4 |
| I | D | 2 | 2 | 8 |
| J | E, G | 6 | 7 | 8 |

- (i) Construct the project network.
 (ii) Find the expected duration and the variance of each activity.
 (iii) Find the critical path and the expected project completion time.
 (iv) What is the probability of completing the project on or before 35 weeks? (16)

12. (a) (i) Differentiate DOM and SAX based XML parsing. (6)
(ii) Explain SAX based parsing with example. (10)

Or

- (b) (i) Give a brief note on Modeling databases in XML. (5)
(ii) With example show how XSLT can transform an XML document into HTML. (8)
13. (a) Compare SOA with client-server and distributed internet architectures. (16)

Or

- (b) Summarize the various principles of service orientation in detail. (16)
14. (a) Discuss in detail about Orchestration and Choreography. (16)

Or

- (b) Explain in detail about Atomic Transaction Process with suitable diagrams. (16)
15. (a) Identify the various steps involved in service oriented modeling elaborate them in detail. (16)

Or

- (b) Illustrate in detail about the WS — BPEL with code snippets. (16)